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UNIVERSITY OF SWAZILAND

RESIT EXAMINATION PAPER

PROGRAMME: ALL YEAR 1 PROGRAMMES (AGRICULTURE & CONSUMER SCIENCES)

COURSE CODE: ABE102

TITLE OF PAPER: PHYSICS

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

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SECTION 1: COMPULSORY QUESTION

QUESTION 1

a. A 300 g object slides 80 cm along a horizontal tabletop. How much work is done in overcoming friction between the object and the table if the coefficient of kinetic friction is 0.20? **[10 marks]**

b. A hoisting machine lifts a 300 kg load a height of 8 m in a time of 20 s. The power supplied to the engine is 20 hp. Compute,

i. The work output **[5 marks]**

ii. The power output and power input **[5 marks]**

iii. The efficiency of the engine and hoist system **[10 marks]**

c. Define the following terms:

i. Density **[2 marks]**

ii. Hydrostatic pressure **[2 marks]**

iii. Electric motor **[2 marks]**

iv. Atmospheric pressure **[2 marks]**

v. Transformer **[2 marks]**

SECTION II: ANSWER ANY TWO (2) QUESTIONS

QUESTION 2

a. One kilogram of steam at 100°C and 101 kPa occupies 1.68 m^3.

i. What fraction of the observed heat of vaporisation of water is accounted for by the expansion of water into steam? **[10 marks]**

ii. Determine the increase in internal energy of 1.0 kg of water as it is vaporised at 100°C. **[10 marks]**

b. Define Ohm's law as used in electricity. **[5 marks]**

c. State the law of reflection of light **[5 marks]**

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QUESTION 3

a. A transformer is connected to 220 V supply mains and the output is connected to a 1.8 W (6.0 V) rated lamp.

i. Name the type of this transformer, clearly state your reasons **[5 marks]**

ii. Calculate the ratio of the number of turns in the secondary coils to the number of turns in the primary coils **[5 marks]**

iii. Calculate the normal working current of the lamp **[5 marks]**

iv. Calculate the resistance of the lamp **[5 marks]**

b. Derive the dimensions of:

i. Density **[3 marks]**

ii. Pressure **[3 marks]**

iii. Work **[4 marks]**

QUESTION 4

a. State the three (3) equations of linear motion **[6 marks]**

b. State any two (2) useful functions of friction **[4 marks]**

c. A stone is thrown vertically upward with an initial velocity of 100 m/s (assume symmetry). At the same instant another stone is thrown vertically downward from the top of a 280 m cliff with an initial velocity of 40 m/s, neglecting air friction,

i. Find the time when the stones pass each other **[10 marks]**

ii. Find the height above the ground at which the stones pass each other **[5 marks]**

iii. When are the velocities of the stones the same? (time) **[5 marks]**